

JC20 Rec'd PCT/PTO 1 4 JUL 2005

## TREATING SLURRIES

This invention relates to a composition for treating inorganic slurries and to a method of treating inorganic slurries with the aforesaid composition  
5 so as to maintain the slurries in a substantially homogeneous phase.

The present invention will be described herein with particular reference to calcium carbonate-based slurries, especially those used in paper-making processes, although it is not to be construed as being limited thereto.

10

Most inorganic slurries contain about 70% to 80% by weight of solids. Many inorganic slurries (particularly those based on calcium carbonate) are known to be susceptible to bacterial contamination and it has been the practice to add one or more biocidally-active materials to the slurries in  
15 order to minimise such contamination.

Phosphorus-containing compounds, in particular tetrakis(hydroxyorgano)phosphonium salts (THP<sup>+</sup> salts) are known to be effective biocides. Experimental work carried out by the applicants has  
20 shown, for example, that the addition of a solution of tetrakis(hydroxymethyl)phosphonium sulphate (THPS) to a calcium carbonate-based slurry can give rise to a reduction in bacterial count of 10<sup>4</sup> in 2 hours.

25 However, it is also known that addition of THPS alone to a slurry results in instantaneous heterogeneous thickening and aggregation of the slurry.

The applicants have found that the use of a composition comprising a THP<sup>+</sup> salt and a dispersant will provide continuing preservation against  
30 bacterial contamination, while at the same time maintaining the slurry in a substantially homogeneous phase.

Accordingly, in a first aspect, the present invention provides a composition for treating an inorganic slurry, the composition comprising:

- 5 (a) a tetrakis(hydroxyorgano)phosphonium salt (hereinafter THP<sup>+</sup> salt);
- and
- (b) a dispersant selected from the group consisting of:
- 10 (i) phosphonated compounds containing at least one tertiary nitrogen atom;
- (ii) phosphonated oligomers of unsaturated acids;
- 15 (iii) homopolymers of unsaturated acids;
- and (iv) polyphosphates.

20 In accordance with the present invention, the THP<sup>+</sup> salt is preferably tetrakis(hydroxymethyl)phosphonium sulphate.

Alternatively, the THP<sup>+</sup> salt may be tetrakis(hydroxymethyl)phosphonium chloride, phosphate, nitrate or oxalate.

25

A preferred example of a dispersant of the type (b)(i) is a compound having one tertiary nitrogen atom, such as a sodium salt of nitrilotris(methylene phosphate), particularly the tetra-sodium salt.

30 Preferred examples of dispersants of the type (b)(ii) include those oligomers having the general  $H(CH_2OM.CH_2OM)_nPO_3M_2$ , wherein M is a

cationic species such that the oligomer is soluble in water and n is a number greater than 1.

Other suitable oligomers are disclosed in the applicant's European Patent  
5 Specification 0 491 391.

A preferred example of a dispersant of the type (b)(iii) is a homopolymer of acrylic acid, especially a homopolymer having a molecular weight in the range 2000 to 5000.

10

Preferred examples of dispersants of the type b(iv) include sodium tripolyphosphate.

In a second aspect, the present invention provides a method of treating an  
15 inorganic slurry to maintain the slurry in a substantially homogeneous phase, the method comprising the addition to the slurry of an effective amount of a composition according to the first aspect of the present invention.

20 The inorganic slurry may, for example, comprise a calcium carbonate-based slurry.

Alternatively, the inorganic slurry may comprise a pigment slurry, a clay slurry or a cement slurry.

25

Preferably, the ratio of THP<sup>+</sup> salt to dispersant in the composition is about 2:1 (as active ingredients).

Suitably, the composition may be added to the slurry in an amount in the  
30 range 10ppm to 1000ppm (by weight of the slurry), for example about 750ppm (by weight of the slurry).

The present invention will be illustrated by way of the following examples.

- 5 In the examples, a 75% calcium carbonate slurry (commercially known as Setacarb) was treated with:

Example 1 : THP<sup>+</sup> salt alone.

- 10 Example 2 : THP<sup>+</sup> salt and dispersant of type (b)(i).

Example 3 : THP<sup>+</sup> salt and dispersant of type (b)(ii).

15 The amounts of each additive used, and the results, are given in the TABLE below.

TABLE

20	Example	THP <sup>+</sup> salt	Dispersant	Result
	No.	(ppm)	(ppm)	
	1	(a) THPS 750ppm	(b) (nil)	Instant heterogeneous thickening
25	2	(a) THPS 750ppm	b(i) 375ppm	No thickening
	3	(a) THPS 750ppm	b(ii) 375ppm	No thickening

Notes to TABLE

- (a) An aqueous solution of tetrakis(hydroxymethyl)phosphonium sulphate (75% a.i.), available as TOLCIDE®-PS75.
- 5
- (b)(i) An aqueous solution of the tetra sodium salt of nitrilotris(methylene phosphonic acid), available as BRIQUEST® 301-32S.
- 10 (b)(ii) A homopolymer of polyacrylic acid, having a molecular weight in the range 2000-5000 and available as BEVALOID®211.